



# NASA STEM VIRTUAL TOOLKIT 2022



INSPIRE - ENGAGE - EDUCATE - EMPLOY  
The Next Generation of Explorers

# NASA STEM VIRTUAL TOOLKIT

## SECTION 1: OVERVIEW

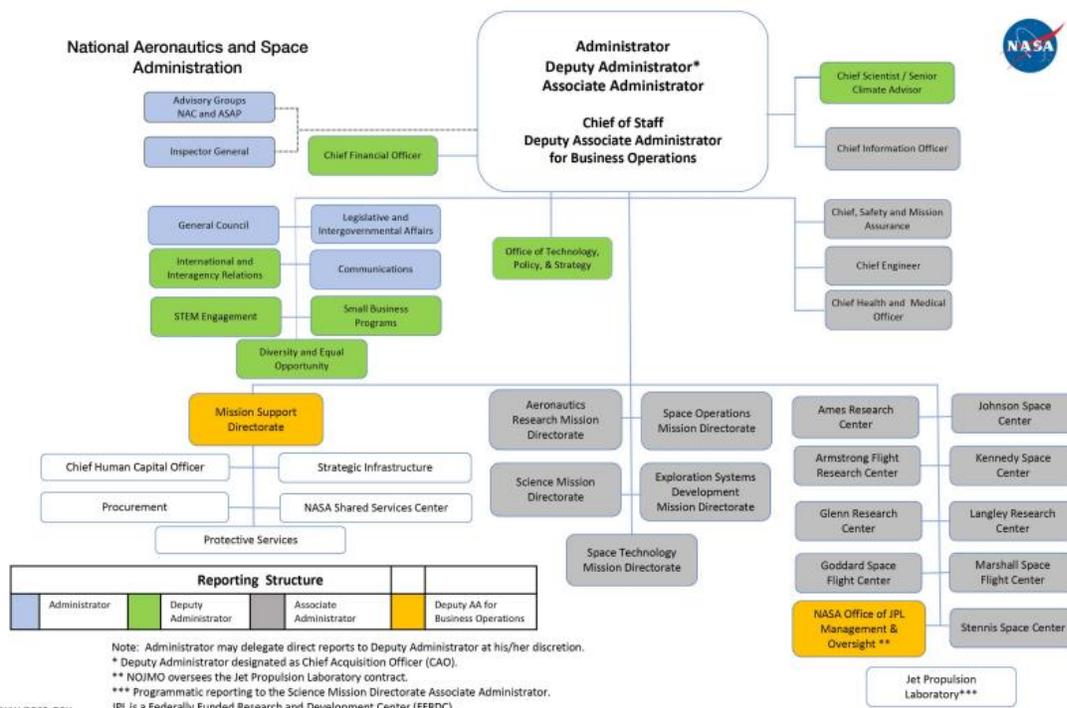
### How to Navigate NASA Resources

NASA has a wide variety of STEM resources that are available for formal educators, informal education settings, at-home use, self-directed learning, and for those who just want to learn more about space and aeronautics. This virtual toolkit is created to help you navigate many of NASA's resources for a K-12 audience. Note that the resources in this toolkit are not all-inclusive; many NASA resources can also be found through some of our partner organizations and new material is being created every day. The next section provides a brief overview of NASA's structure, which may also help you find our many resources both listed here in the toolkit and the others.

### NASA Structure and Programs

#### Mission Directorates, Office of STEM Engagement, NASA Centers and More

Like many large organizations, NASA has an organization and structure that allows for both national initiatives as well as more local and specialized work. For the components that most influence NASA's STEM content, it is helpful to know that NASA is made up of five mission directorates that each have specific focus areas such as aeronautics research, space operations, and exploration systems development, along with our Office of STEM Engagement (OSTEM), which focuses on ways to bring relevant STEM content to students of all ages. In addition, NASA operates nine NASA Centers, several smaller satellite Centers, and our Jet Propulsion Laboratory, which is jointly operated by NASA and CalTech University. Some educational resources are created and available directly from mission directorates and NASA Centers, while others are created through OSTEM. Directorates, Centers, and OSTEM work together on many endeavors, yet each have unique focus areas and can engage STEM audiences differently. This also leads to products that can be found in multiple locations on our primary website and NASA Center websites.



## Next Gen STEM

Within OSTEM you can find the Next Gen STEM program (NGS) that highlights four main areas of NASA exploration: Aeronaut-X (aeronautics), Earth, Moon, and Solar System and Beyond. This program's mission is to spark and sustain interest in STEM in students in grades K-12 by connecting students and their formal and informal educators to NASA's endeavors in exploration and discovery. NGS creates, delivers and curates NASA STEM products and experiences that make connections to NASA and fuel STEM learning and identity. We are committed to diversity, inclusion and equity. NGS strives to reduce the barriers to participation in STEM.

<https://www.nasa.gov/stem/nextgenstem/index.html>

## SECTION 2: EDUCATOR PROFESSIONAL DEVELOPMENT AND STAYING CONNECTED



### NASA Express

NASA Express is a “one-stop shop” weekly newsletter featuring updates from NASA and STEM associates about workshops, internships, and fellowships; applications for grants and collaborations; online professional development; student competitions; and more. Subscribe to get updates sent to your inbox each Thursday. Opportunities from across the NASA agency for educators, students, and organizations are a part of this weekly newsletter.

[https://www.nasa.gov/audience/foreducators/Express\\_Landing.html](https://www.nasa.gov/audience/foreducators/Express_Landing.html)



### NASA EPDC

NASA's Educator Professional Development Collaborative conducts much of NASA's educator professional development. In-person, virtual, and hybrid opportunities, along with student and educator badging is available. Professional development connects educators of all types with NASA activities and lessons that are tied to our missions and programs including aeronautics, Earth, Moon, Solar System and Beyond, and more. Virtual professional development opportunities are available at no cost to participants.

<https://www.txstate-epdc.net>

- **Synchronous Professional Development**
  - Opportunities such as webinars, face-to-face, and conferences  
<https://www.txstate-epdc.net/event-post/>
- **Asynchronous Professional Development**
  - Opportunities thru earning badges for both educators and students  
<https://www.txstate-epdc.net/digital-badging>
- **QuickBits**
  - Demonstration video by a NASA Education Specialist explaining a Big Idea in Science Content or a Science and Engineering Practice. All videos are aligned to Next Generation Science Standards (NGSS) and include links to NASA resources and content.  
<https://www.txstate-epdc.net/quick-bits/>



## MIE Alliance

The Museum and Informal Education Alliance is a site dedicated to informal education and resources that are especially helpful for museums, science centers, camps, afterschool organizations, and anyone else who is looking for NASA resources that focus on a more informal approach to education.

<https://informal.jpl.nasa.gov/museum/>



## NASA Connects

NASA Connects is an interactive space for educators to connect to resources, people, and other NASA opportunities. By creating an account, users can find collaborators and peers, build their own repository of NASA lessons and activities, stay up-to-date on student and educator opportunities, and more.

<https://nasacentral.force.com/cop/s/>



## NASA Social Media

In our increasingly technologically-connected world, there are many ways to virtually join NASA on our adventures. We are active on most popular social media sites, and there is something for every interest.

<https://www.nasa.gov/socialmedia>



## SECTION 3: ACTIVITY GUIDES AND RESOURCES FOR EDUCATORS AND PARENTS

### Highlighting NASA Resources

There are multiple ways to search for STEM content at NASA. Two primary search criteria are 1.) by grade level/band and 2.) by topic. In the sections below, we provide a highlight of some of our favorite lessons and activities broken down by both grade level/band and by topic. In the next section, some of our great content is shared with you by topic. On our website, search tools make it easy to search using the criteria you prefer.

<https://www.nasa.gov/stem>

### By Grade Level:



#### NASA STEM for Grades K-4

<https://www.nasa.gov/stem/forstudents/k-4/index.html>

With multiple types of activities and ways to interact with NASA content, we work to reach students where they are. The main categories highlighted for a K-4 audience below include:

- **Play It:** This section contains a sample of the games elementary students can play that teach about aviation and space.
- **Make It:** In this section, hands-on activities are highlighted.
- **Solve It:** A variety of games and puzzles are a great way to help some students get engaged in STEM. This section contains some of our large selection of games and puzzles.
- **Color It:** Learning pages that are fun to color can be found here.
- **Read It:** Literacy and STEM are both crucial skills students need to learn. This section shares a small number of our programs that focus on both literacy and STEM.
- **Explore It:** These activities give students the chance to dig a bit deeper into one of our many STEM topics.

### PLAY IT!!

#### Addition Blast Off

- Given a random number board, click on numbers that add up to a target number. The more numbers you use, the more points you earn. Keep going until you clear the board.

<https://www.nasa.gov/specials/kidsclub/games/addition-blast-off/index.html>

#### Airplane High Low

- What Number am I thinking of? Chose a number and if you're wrong, I'll tell you if it is higher or lower.

<https://www.nasa.gov/specials/kidsclub/games/airplane-high-low/>

#### Color Nature at NASA

- Nature is important to NASA. Learn about plants and animals that live at NASA Centers across the U.S. while exploring pictures. Click to paint and color the same picture.

<https://www.nasa.gov/specials/kidsclub/games/color-NASA/index.html>

### Explore Mars

- Drive a Rover on Mars by sending a sequence of commands. Choose rocks to investigate and collect data while doing any of 8 expeditions!  
<https://spaceplace.nasa.gov/explore-mars/en/>

### Flip Time

- Test your memory and your clock skills. Match a digital clock reading with an analog clock. Keep the airplanes at an airport running on time.  
<https://www.nasa.gov/specials/kidsclub/games/flip-time/>

### Jumbled Jets

- With airplanes mixed up on the runway, use patterns and combinations to determine which planes are in the fleet and how they should be lined up.  
<https://www.nasa.gov/specials/kidsclub/games/jumbled-jets/index.html>

### Rocket Builder

- Build a fleet of rockets. Click and drag on rocket parts to build one of five rockets given the rocket plans.  
<https://www.nasa.gov/specials/kidsclub/games/rocket-builder/index.html>

### Space Lunch Game!

- Learn about food groups and nutrition with this matching game.  
<https://www.nasa.gov/specials/kidsclub/games/space-lunch/index.html>

### Star Fall

- Learn about stars. Use your knowledge to group stars of the same color. Earn points as you remove stars before the timer runs out.  
<https://www.nasa.gov/specials/kidsclub/games/star-fall/>

### What comes next?

- Look at a pattern. Determine what is missing. Complete the pattern.  
<https://www.nasa.gov/specials/kidsclub/games/what-comes-next/index.html>

## MAKE IT!!

### BEST Activity Guide: An Education Guide to the Engineering Design Process

- NASA's BEST activities nurture development of 21st. century skills including communication, collaboration and innovation. The activities are flexible in terms of materials, time, students' abilities, and resources. BEST Activity Guides couple NASA engineering content and themes to help teach students the engineering design process, and the guides reflect NASA's role as a leader in space, technology, aeronautics, and science.  
[https://www.nasa.gov/pdf/630755main\\_NASAsBESTActivityGuideK-2.pdf](https://www.nasa.gov/pdf/630755main_NASAsBESTActivityGuideK-2.pdf)  
[https://www.nasa.gov/pdf/630753main\\_NASAsBESTActivityGuide3-5.pdf](https://www.nasa.gov/pdf/630753main_NASAsBESTActivityGuide3-5.pdf)

### **Build a Rocket and More with Shapes**

- Try piecing together your own rocket design using triangles, squares and rectangles! Then, see what other designs you can build with these geometric shapes.

<https://www.jpl.nasa.gov/edu/learn/project/build-a-rocket-and-more-with-shapes/>

### **Build Your Very Own Mars Helicopter!**

- NASA is sending a helicopter to Mars! This helicopter is called Ingenuity and is designed to test whether or not flight is a good way to study distant bodies in space. We have sent spacecraft to other planets, but this is the first aircraft that will fly on another world. In this activity, you will learn about this amazing feat of engineering as you build your own Mars helicopter model.

[https://www.nasa.gov/sites/default/files/atoms/files/build\\_your\\_own\\_mars\\_helicopter.pdf](https://www.nasa.gov/sites/default/files/atoms/files/build_your_own_mars_helicopter.pdf)

### **Build Your Own Spacecraft**

- How would you like to be the chief engineer for an important NASA mission? Design the latest and greatest satellite. Your satellite could help study things happening on Earth, take pictures of planets in our solar system, keep an eye on our sun, or even find planets elsewhere in the universe!

<https://spaceplace.nasa.gov/build-a-spacecraft/en/>

### **Make a Cloud Mobile**

- Learn about different types of clouds. Then follow a video to learn how to create your own cloud mobile.

<https://spaceplace.nasa.gov/cloud-mobile/en/>

### **Make a Comet on a Stick!**

- Learn about comets and then make your own comet that you can fly around the room!

<https://spaceplace.nasa.gov/comet-stick/en/>

### **Make a Galactic Model**

- A galaxy is a grouping of stars. All but a few stars in the universe live in galaxies. Make your own collection of beautiful galaxies and suspend them on a mobile.

<https://spaceplace.nasa.gov/galactic-mobile/en/>

### **Make an Ocean Ecosystem Dessert**

- Learn more about some of the plants and animals of the ocean ecosystem! With this activity, make a cool and tasty version of the ocean ecosystem!

<https://climatekids.nasa.gov/ocean-ecosystem/>

### **Make Universe Slime**

- Did you know that our universe is stretching out in all directions? It's true! Ever since the universe began about 13.8 billion years ago, it's been stretching out and expanding. In this activity, you'll make your own stretchy universe slime.

<https://spaceplace.nasa.gov/universe-slime/en/>

### **Make a Straw Rocket**

- Create a paper rocket that can be launched from a soda straw – then, modify the design to make the rocket fly farther!  
<https://www.jpl.nasa.gov/edu/learn/project/make-a-straw-rocket/>

### **Make and Color a Paper Airplane**

- Learn to make paper airplanes. Print the pattern and watch the video to make a paper airplane and learn about NASA airplanes.  
<https://www.nasa.gov/stem-ed-resources/make-and-color-a-paper-airplane.html>

### **Make Your Own X-59**

- X-59 (QueSST) One of NASA's newest experimental aircraft, the X-59 (QueSST) is designed to lower the noise created by planes flying faster than the speed of sound. Make a paper airplane version of the X-59.  
[https://www.nasa.gov/sites/default/files/atoms/files/make\\_your\\_own\\_x-59\\_directions.pdf](https://www.nasa.gov/sites/default/files/atoms/files/make_your_own_x-59_directions.pdf)

## **SOLVE IT!!**

### **Earth's Seasons and the Sun: A Crossword Puzzle**

- Each year, Earth makes a complete trip around the Sun! Learn about our planet's journey and important points along its orbit. Visit the two websites to find clues to solve this crossword puzzle!  
<https://www.nasa.gov/stem-ed-resources/seasons-crossword-puzzle.html>

### **Forward to the Moon with Artemis**

- Play word and number puzzles, spot the difference, coding, tracing, and other activities as we celebrate the 50th anniversary of Apollo, we look forward to NASA's new Artemis mission that will land the first woman, the first person of color and the next man on the surface of the moon.  
<https://www.nasa.gov/sites/default/files/atoms/files/forwardmoonexploreractivities-1.pdf>

### **International Space Station Puzzles**

- Challenge your word and math skills while you learn about the International Space Station. Download and print these crossword and emoji math puzzles. Emoji math uses icons and popular emojis in place of numbers, letters and variables in a math problem. Themed puzzles celebrate Nov. 2, 2000 as the first day of continuous habitation of humans living and working on the station.  
<https://www.nasa.gov/stem-ed-resources/iss-puzzles.html>

### **ISS Activity Book**

- Learn about the International Space Station thru fun activities. Excite your students' imaginations and engender in them an interest in math and science, culminating in their pursuit of space-related careers or hobbies.  
[https://www.nasa.gov/sites/default/files/atoms/files/iss\\_activity\\_book.pdf](https://www.nasa.gov/sites/default/files/atoms/files/iss_activity_book.pdf)

### **Junior Ranger Spaceflight Explorer—Explorer's Activity Guide**

- Play word and number puzzles while learning about the Moon, space vehicles that will take humans to the Moon and to Mars, and national parks

across the United States. NASA and National Park Service made this booklet of fun activities. The printable booklet has math puzzles, thought questions, spot the difference pictures, matching puzzles, scrambled words and anagrams. Take the pledge and put your name on the certificate.  
<https://www.nasa.gov/stem-ed-resources/junior-ranger-spaceflight.html>

### Junior Pilot Program: X-59 (K-5)

- Join Orville D. Squirrel as he explores the science of sound and NASA's X-59 experimental aircraft. Stories, activities, and games are a part of this booklet, which is available in both English and Spanish.

<https://www.nasa.gov/sites/default/files/atoms/files/junior-pilot-print.pdf>

(English)

<https://www.nasa.gov/sites/default/files/atoms/files/junior-pilot-spanish.pdf>

(Spanish)

### SCaN Message Decoder Activities

- The Space Communications and Navigation (SCaN) Program has antennas around the world and satellites in space to help guide and exchange important information for all NASA spaceflight missions. Astronauts, mission controllers, and scientists rely on SCaN to transmit message from Earth to space and back in order to communicate. These activities allow students to decode secret messages!

[https://www.nasa.gov/directorates/heo/scan/communications/outreach/students/scan\\_message\\_decoder](https://www.nasa.gov/directorates/heo/scan/communications/outreach/students/scan_message_decoder)

### Space Math @ NASA

- Visit this NASA resource to download hundreds of math problems featuring a behind the scenes look at NASA press releases and discoveries. The problems range from simple scaling and proportions to algebra and calculus, and cover topics spanning all NASA science and engineering activities. You can search for problems by grade level, topic, space science topic, or NASA mission. There are so many possibilities.

<https://spacemath.gsfc.nasa.gov/>

### Space Tech Fun Pad

- Technology Drives Exploration. Play word and number puzzles, spot the difference, coding, tracing, matching and other activities as you learn about NASA Technology.

[https://www.nasa.gov/sites/default/files/atoms/files/space\\_tech\\_funpad\\_tagged.pdf](https://www.nasa.gov/sites/default/files/atoms/files/space_tech_funpad_tagged.pdf)

## COLOR IT!!

### A-Z Commercial Crew Coloring Sheets

- Learn about NASA's Commercial Crew Program as you work thru these A-to-Z activity sheets that you can also color.

<https://www.nasa.gov/sites/default/files/atoms/files/a-z-activity-sheets.pdf>

### High Flyers Alphabet Activity Book

- The High Flyers Alphabet Activity book introduces basic aeronautics terms. Students can color and practice letter writing, learn new words, solve

simple addition problems, and more. Available in English and Spanish.  
<https://www.nasa.gov/stem-ed-resources/high-flyers.html>

### **NASA Coloring Pages**

- Color and learn about our solar system using these coloring pages.  
<https://spaceplace.nasa.gov/coloring-pages/en/>

### **Space Communications and Navigation (SCaN) A-to-Z**

- Learn all about Space Communications and Navigation from A-to-Z! Explore an animated gallery or an image gallery or print an A to Z coloring book. There are also A to Z trading cards and a classroom poster.  
[https://www.nasa.gov/directorates/heo/scan/communications/outreach/students/a\\_to\\_z](https://www.nasa.gov/directorates/heo/scan/communications/outreach/students/a_to_z)

### **Space Launch System Coloring Book**

- Learn about the Space Launch System with coloring and puzzles.  
[https://www.nasa.gov/sites/default/files/atoms/files/sls\\_coloring\\_book\\_08072019\\_508.indd\\_.pdf](https://www.nasa.gov/sites/default/files/atoms/files/sls_coloring_book_08072019_508.indd_.pdf)

## **READ IT!!**

### **Astro-Not-Yets**

- Read along as the Astro-Not- will learning about the International Space Station and Commercial Crew Program while learning about microgravity.  
[https://www.nasa.gov/sites/default/files/atoms/files/edu\\_ngs\\_np-2021-09-009a\\_astro-not-yets\\_microgravity\\_storybook\\_web508\\_5-22.pdf](https://www.nasa.gov/sites/default/files/atoms/files/edu_ngs_np-2021-09-009a_astro-not-yets_microgravity_storybook_web508_5-22.pdf)

### **Earth Observatory (EO) KIDS**

- EO Kids is written for audiences aged 9 to 14. It is published with support from NASA's Landsat, Terra, and Aqua missions. Read all about a variety of Earth science topics like hurricanes and air pollution and experiment with exciting hands-on activities with EO Kids.  
<https://earthobservatory.nasa.gov/blogs/eokids/>

### **GLOBE Program**

- Since its founding on Earth Day 1994, the Global Learning and Observations to Benefit the Environment (GLOBE) Program has been providing students and the public worldwide with the opportunity to meaningfully contribute to our understanding of the Earth system and global environment. Through interdisciplinary activities and inquires into the various Earth spheres, GLOBE gives students a hands-on approach to the scientific method, as citizens conduct real-world research. Elementary level activities through adult opportunities are a part of the program. A sample of the many elementary activities are found below.  
*Note that each elementary activity also includes a storybook.*  
<https://www.globe.gov/web/elementary-globe>

### **GLOBE Air Quality**

- Students will investigate why aerosols and other types of air pollution affect the color of the sky. They'll also learn how to describe the sky color and the underlying conditions in the atmosphere.  
<https://www.globe.gov/web/elementary-globe/overview/air-quality>

### **GLOBE Clouds**

- Students will explore how different types of clouds can be described via analogy. As they start understanding how to observe clouds, they'll create models of the different cloud types and contrails.  
<https://www.globe.gov/web/elementary-globe/overview/clouds>

### **GLOBE Earth System**

- Students will examine how water, air, soil, and living creatures interact within the Earth system. They'll also learn the importance of each role to the planet's ecology. Includes a storybook as well as activities.  
<https://www.globe.gov/web/elementary-globe/overview/earth-system>

### **GLOBE Seasons**

- Students will discover how hummingbirds deal with seasonal changes. To broaden their scope, they'll use science journals to describe the changes in their own local environment as it cycles through the different seasons. Includes a storybook as well as activities.  
<https://www.globe.gov/web/elementary-globe/overview/seasons>

### **GLOBE Water**

- Students will learn how to describe a creek by making observations, taking measurements, and investigating its macroinvertebrates. To accomplish this, they'll be introduced to measurement tools like rulers and magnifying glasses.  
<https://www.globe.gov/web/elementary-globe/overview/water>

### **Leveled Readers and More**

- NASA Aeronautics' leveled readers series brings the history of American aviation to life by highlighting the accomplishments of famous and historical aviators and the options for STEM careers as seen through the stories of contemporary NASA aeronautics experts. Stories at a variety of reading levels, along with supplemental videos, sound clips, and support pages help bring these stories to life.  
<https://www.nasa.gov/aeroresearch/resources/leveled-readers>

### **Story Time from Space**

- Astronauts on the Space Station read stories to and conducting science experiments for the children of Earth as the world rotates below. While in space, astronauts are videotaping themselves reading various children's books to the children of Earth. There are additional activities and resources beyond the story time videos.  
<https://storytimefromspace.com/library/>

### **Why Do We Explore?**

- Follow along on the computer to find out reasons to explore. Read the story to yourself or have it read to you.  
<https://www.nasa.gov/specials/kidsclub/games/why-do-we-explore/index.html>

### You Are Going

- You Are Going, illustrated by former NASA intern Shane Tolentino, shares a glimpse into future Artemis missions. Learn all about the elements that will help make Artemis possible: the powerful Space Launch System rocket, the Orion spacecraft, the Gateway, and so much more.  
<https://www.nasa.gov/specials/you-are-going/>

## EXPLORE IT!!

### Airplanes and Flying

- Check out this website to find games to play, videos to watch, things to make and stories to read for students in grades K-4.  
[https://www.nasa.gov/audience/forstudents/k-4/more\\_to\\_explore/Airplanes-and-Flying.html](https://www.nasa.gov/audience/forstudents/k-4/more_to_explore/Airplanes-and-Flying.html)

### Astronauts

- Check out this website to find games to play, videos to watch, things to make and stories to read for students in grades K-4.  
[https://www.nasa.gov/audience/forstudents/k-4/more\\_to\\_explore/Astronauts.html](https://www.nasa.gov/audience/forstudents/k-4/more_to_explore/Astronauts.html)

### Earth

- Check out this website to find games to play, videos to watch, things to make and stories to read for students in grades K-4.  
[https://www.nasa.gov/audience/forstudents/k-4/more\\_to\\_explore/Earth.html](https://www.nasa.gov/audience/forstudents/k-4/more_to_explore/Earth.html)

### Jumbled Jets

- The airplanes are mixed up on the runway. Using patterns and combinations, determine which planes are in the fleet and how they should be lined up.  
<https://www.nasa.gov/specials/kidsclub/games/jumbled-jets/index.html>

### International Space Station

- Check out this website to find games to play, videos to watch, things to make and stories to read for students in grades K-4.  
[https://www.nasa.gov/audience/forstudents/k-4/more\\_to\\_explore/International-Space-Station.html](https://www.nasa.gov/audience/forstudents/k-4/more_to_explore/International-Space-Station.html)

### Moon to Mars

- Check out this website to find games to play, videos to watch, things to make and stories to read for students in grades K-4.  
[https://www.nasa.gov/audience/forstudents/k-4/more\\_to\\_explore/moon-to-mars.html](https://www.nasa.gov/audience/forstudents/k-4/more_to_explore/moon-to-mars.html)

### NASA's Our World – a part of NASA EClips

- A collection of both videos and educator guides. The educator guides provide examples of ways that teachers may effectively use video segments as an instructional tool. All lessons are presented in the 5E delivery model and are aligned to national standards for science, math, and technology.

[https://nasaclips.arc.nasa.gov/resources/guides#Full\\_Guide\\_grades\\_K-5\\_Our\\_World](https://nasaclips.arc.nasa.gov/resources/guides#Full_Guide_grades_K-5_Our_World)

<https://nasaclips.arc.nasa.gov/video/ourworld>

### **Planets and Moons**

- Check out this website to find games to play, videos to watch, things to make and stories to read for students in grades K-4.

[https://www.nasa.gov/audience/forstudents/k-4/more\\_to\\_explore/Planets-and-Moons.html](https://www.nasa.gov/audience/forstudents/k-4/more_to_explore/Planets-and-Moons.html)

### **Stars, Constellations, and Astronomy**

- Check out this website to find games to play, videos to watch, things to make and stories to read for students in grades K-4.

[https://www.nasa.gov/audience/forstudents/k-4/more\\_to\\_explore/Stars-Constellations-Astronomy.html](https://www.nasa.gov/audience/forstudents/k-4/more_to_explore/Stars-Constellations-Astronomy.html)

### **Weather and Climate**

- Check out this website to find games to play, videos to watch, things to make and stories to read for students in grades K-4.

[https://www.nasa.gov/audience/forstudents/k-4/more\\_to\\_explore/Weather-and-Climate.html](https://www.nasa.gov/audience/forstudents/k-4/more_to_explore/Weather-and-Climate.html)

### **What did Hubble See on Your Birthday?**

- Hubble explores the universe 24 hours a day, 7 days a week. That means it has observed some fascinating cosmic wonder every day of the year, including on your birthday. Enter any month and date to find out!

<https://www.nasa.gov/content/goddard/what-did-hubble-see-on-your-birthday>



## NASA STEM for Grades 5-8

<https://www.nasa.gov/stem/forstudents/5-8/index.html>

Like our K-4 resources, we similarly categorized some of our most popular STEM activities for our grades 5-8 audience by category. These include:

- **Build It:** There are many hands-on activities in this section.
- **Play It:** Engage students with a selection of games.
- **Watch It:** Some say “a picture is worth a thousand words.” Videos can say even more. In this section, we’ve put together some of our favorite award-winning videos for students.
- **Explore It:** These activities give students the chance to dig a bit deeper into one of our many STEM topics.
- **Solve It:** A variety of games and puzzles are a great way to help some students get engaged in STEM. This section contains some of our large selection of games and puzzles.

## BUILD IT!!

### BEST Activity Guide: An Education Guide to the Engineering Design Process

- NASA's BEST activities nurture development of 21st. century skills including communication, collaboration and innovation. The activities are flexible in terms of materials, time, students' abilities, and resources. BEST Activity Guides couple NASA engineering content and themes to help teach students the engineering design process, and the guides reflect NASA's role as a leader in space, technology, aeronautics, and science.  
[https://www.nasa.gov/pdf/630754main\\_NASAsBESTActivityGuide6-8.pdf](https://www.nasa.gov/pdf/630754main_NASAsBESTActivityGuide6-8.pdf)

### BEST Next Generation Activity Guide: Technology Demonstration Missions

- An additional set of BEST activities designed with NASA's Technology Demonstration Missions. The missions provide revolutionary, crosscutting technologies that could advance NASA's mission in space and benefit science and industry here on Earth. The missions include Green Propellant Infusion Mission (GPIM), Deep Space Atomic Clock, Low Density Super Sonic Decelerator and several more.  
<https://www.nasa.gov/audience/foreducators/best/activities.html>

### Build an Anemometer

- Measure wind speed with a homemade anemometer. Test it and then learn about the importance of wind speed when flying an airplane.  
<https://www.nasa.gov/stem-ed-resources/build-an-anemometer.html>

### Build Your Own Universe Exploration Fleet

- There are several spacecraft exploring our Universe. You can build paper versions of many of them right here on Earth. These include the Compton Gamma Ray Observatory, Hubble Space Telescope, James Webb Space Telescope, OSIRIS-Rex and several more.  
<https://science.nasa.gov/kids/the-universe/universe-spacecraft-paper-models>

### Changing Pressure

- You can understand Bernoulli's principle, which explains how a change in air pressure helps lift airplane wings.  
<https://www.nasa.gov/stem-ed-resources/changing-pressure.html>

### Edible Model of the Sun

- The Sun is a dynamic and active star. If you look at it with a telescope, or even with a pin-hole camera or special eclipse glasses, you can see features on the sun that are moving and changing. (Remember you should never look directly at the sun!) Participants will make an edible model of the Sun's outer layers using cookies and toppings.  
[https://sunearthday.nasa.gov/2007/materials/solar\\_cookie.pdf](https://sunearthday.nasa.gov/2007/materials/solar_cookie.pdf)

### Get your Gummy Greenhouse Gases!

- Molecules are tiny structures that make up just about all matter—including you! Molecules themselves are made of atoms, the basic building blocks of matter. Using just four kinds of atoms as building blocks, you can construct many different types of molecules. In this project, you will build models of some gas molecules. These kinds of gas molecules are part of the air. They are called greenhouse gases.  
<https://spaceplace.nasa.gov/gumdrops/en/>

### Impact Craters

- Create your own impact craters! When astronauts visit the Moon for the Artemis III missions, they will be able to study the craters that may contain water and ice. Testing and studying these craters may help NASA identify areas on the Moon that are rich in water and other resources to determine how to best use those materials while on the lunar surface.  
<https://www.nasa.gov/stem-ed-resources/impact-craters.html>

### Lifecycle of a Star Bracelets and Bookmarks

- All stars have a lifecycle and the James Webb Space Telescope will be able to help us see these cycles better than we have ever been able to before. Learn more about a star's lifecycle as you build either a bracelet or a bookmark with different color beads highlighting each stage in the cycle.  
<https://webb.nasa.gov/education/SeeingStarlightMadScience.8.11.21.pdf>  
<https://webb.nasa.gov/education/JWSTLifeCyclesActivity.pdf>

### Make a Moon Phases Calendar and Calculator

- Students use their knowledge of the phases of the Moon to assemble a printable Moon Phases Calendar and Calculator. They can then use the tool to look up the phase of the Moon for any day of the year and predict when and where the Moon will be visible.  
<https://www.jpl.nasa.gov/edu/teach/activity/make-a-moon-phases-calendar-and-calculator/>

### Make a Scale Solar System

- Have you ever wondered about the sizes of planets in the solar system or the distances between them? In this project, you will create your own scale model of the solar system by learning how to calculate scale distances, the relative sizes of planets, or both. Then, use beads and string, sidewalk

chalk, or your own creative choice of materials to build a model you can explore – or maybe even wear!

<https://www.jpl.nasa.gov/edu/learn/project/make-a-scale-solar-system/>

### **Make A Straw Plane**

- You can build an airplane that has ailerons, elevators, and a rudder. These parts will help you control your plane better. You can then adjust these parts to see how the flight of your plane changes.

<https://www.nasa.gov/stem-ed-resources/make-a-straw-plane.html>

### **Make Oreo Moon Phases!**

- Learn about the Phases of the moon. Use Oreo cookies to demonstrate the different phases of the moon.

<https://spaceplace.nasa.gov/oreo-moon/en/>

### **Space Origami: Make Your Own Starshade**

- Imagine trying to photograph a planet from trillions of miles away. Now imagine that planet is in another solar system, where the bright light of its parent star is outshining everything around it. This is what new technology from NASA is trying to do – capture the first images of planets outside our solar system – and you can make your own model of the spacecraft using origami!

<https://www.jpl.nasa.gov/edu/learn/project/space-origami-make-your-own-starshade/>

### **Spaghetti Anyone? Building with Pasta**

- You have 18 minutes to build the tallest freestanding structure to support a marshmallow for at least 15 seconds. Though a marshmallow might not seem like a significant mass to support, find the challenge when constrained to using spaghetti and tape. When building a spaghetti structure, these are the same forces, like gravity and wind, that engineers have to take into consideration when working on Deep Space Network antennas. Brainstorm ideas, discuss strengths/weaknesses, then select a design to build, test and make sure that it can support the marshmallow.

<https://www.jpl.nasa.gov/edu/teach/activity/spaghetti-anyone/>

### **Tornado in a Bottle**

- Simulate a tornado inside a plastic bottle and observe the creation of a water vortex by swirling water in a bottle. Then, learn why pilots must consider weather before flying an airplane.

<https://www.nasa.gov/stem-ed-resources/tornado-in-a-bottle.html>

## **PLAY IT!!**

### **Addition Blast Off**

- Given a random number board, click on numbers that add up to a target number. The more numbers you use, the more points you earn. Keep going until you clear the board.

<https://www.nasa.gov/specials/kidsclub/games/addition-blast-off/index.html>

### Airplane High Low

- What Number am I thinking of? Chose a number and if you're wrong, I'll tell you if it is higher or lower. Keep trying until you get the right number. How many tries do you need?

<https://www.nasa.gov/specials/kidsclub/games/airplane-high-low/>

### DSN Uplink-Downlink: A DSN Game

- How does NASA talk to its faraway spacecraft? With the big antenna dishes of the Deep Space Network (DSN)! In this game you'll use these big antennas to send information to — and receive information from — NASA's robotic explorers in the solar system and beyond. Scientists call this process "uplinking" and "downlinking." An antenna "uplinks" instructions to a spacecraft and "downlinks" the spacecraft's data and images back to Earth.

<https://spaceplace.nasa.gov/dsn-game/en/>

### Explore Mars

- Drive a Rover on Mars by sending a sequence of commands. Choose rocks to investigate and collect data while doing any of 8 expeditions!

<https://spaceplace.nasa.gov/explore-mars/en/>

### Flip Time

- Test your memory and your clock skills. Match a digital clock reading with an analog clock. Keep the airplanes at an airport running on time.

<https://www.nasa.gov/specials/kidsclub/games/flip-time/>

### Rocket Builder

- Build a fleet of rockets. Click and drag on rocket parts to build one of five rockets given the rocket plans.

<https://www.nasa.gov/specials/kidsclub/games/rocket-builder/index.html>

### Scope It Out

- The Webb Telescope may be unusual in appearance - but it has a lot in common with simple tube-shaped telescopes. Play the "Scope It Out!" game to find out more! Scope It Out! includes an introduction to telescopes and two matching games. Be sure to pay attention as you go - the information contained in each level will help you solve the puzzles in the next round. This game is best suited for teens and interested adults.

<https://www.jwst.nasa.gov/content/features/educational/scopeltOut/index.html>

### Smart Skies

- Using hands-on activities and visualization activities, students learn about distance-rate-time through the lens of air traffic control. The companion app, Sector 33, allows students to try their hand at increasingly complex air traffic control situations.

<https://smartskies.nasa.gov/>

<https://www.nasa.gov/centers/ames/Sector33/iOS/index.html>

### Star Fall

- Learn about stars. Use that knowledge to groups stars of the same color. Earn points as you remove as many stars before the timer runs out.  
<https://www.nasa.gov/specials/kidsclub/games/star-fall/>

## WATCH IT!!

### #AskNASA

- In this playlist, NASA experts answer your questions about space exploration, science and aeronautics. Check out #AskNASA  
<https://www.youtube.com/playlist?list=PL2aBZuCeDwIRbJhDIkKXilZRz9ur4VVAA>

### #BackToSchool with NASA Science

- As you get ready for the new school year, consider adding a little space to your curriculum. This playlist features videos exploring the solar system, hands-on activities for future explorers, science explainer content and much more from NASA!  
[https://www.youtube.com/playlist?list=PL2aBZuCeDwIQHlpnk-mRVKL\\_VQCOIsCS](https://www.youtube.com/playlist?list=PL2aBZuCeDwIQHlpnk-mRVKL_VQCOIsCS)

### Dancing Uranus

- In the dance of our solar system, one planet has moves like no other. Find out how Uranus' tilt puts it in a league all its own.  
<https://www.jpl.nasa.gov/edu/learn/video/dancing-uranus/>

### Earth Observatory (EO) KIDS

- EO Kids is published with support from NASA's Landsat, Terra, and Aqua missions. Read about a variety of Earth science topics like hurricanes and air pollution and experiment with exciting hands-on activities with EO Kids.  
<https://earthobservatory.nasa.gov/blogs/eokids/>

### How do NASA Astronauts Communicate Nonverbally in Space?

- How can astronauts in space communicate with each other if their communications channels were to go down or become busy? NASA astronauts explain a few nonverbal ways to communicate to one another that they learned as they were training to live and work on the International Space Station. Can you guess what they're trying to say?  
<https://www.youtube.com/watch?v=OOpVTlrTYXw>

### NASA's Guide to Near-light-speed Travel Guide

- So, you've just put the finishing touches on upgrades to your spaceship, and now it can fly at almost the speed of light. We're not quite sure how you pulled it off, but congratulations! Before you fly off on your next vacation, however, watch this handy video to learn more about near-light-speed safety considerations, travel times, and distances between some popular destinations around the universe.  
<https://svs.gsfc.nasa.gov/13653>

### **NASA's Field Guide to Black Holes**

- Thinking about doing some black hole watching the next time you're on an intergalactic vacation, but you're not quite sure where to start? Well, look no further! This series of videos shows you everything you need to know. With topics ranging from basic black holes, to fancy black holes, to giant black holes and their companions, you'll be more than ready for your next adventure. In addition to the videos, you can also download a printable guide that has even more information.

<https://svs.gsfc.nasa.gov/13834>

### **NASA's Real World – a part of NASA EClips**

- A collection of both videos and educator guides. Educator Guides provide examples of ways teachers may effectively use video segments as an instructional tool. All lessons are presented in the 5E delivery model and are aligned to national standards for science, math, and technology.

[https://nasaclips.arc.nasa.gov/resources/guides#Full\\_Guide\\_grades\\_6-8\\_Real\\_World](https://nasaclips.arc.nasa.gov/resources/guides#Full_Guide_grades_6-8_Real_World)

<https://nasaclips.arc.nasa.gov/video/realworld>

### **What is a Black Hole?**

- A black hole is an area of such immense gravity that nothing -- not even light -- can escape from it.

<https://spaceplace.nasa.gov/black-holes/en/>

## **EXPLORE IT!!**

### **A Guide to Climate Change for Kids**

- Have you heard people talk about climate change? Ever wondered what it is and why we care about it so much? NASA scientists have been studying Earth's climate for more than 40 years. We used what we've learned in that time to answer some of your biggest questions!

<https://climatekids.nasa.gov/kids-guide-to-climate-change/>

### **Citizen Science Projects**

- NASA's citizen science projects are collaborations between scientists and interested members of the public. Through these collaborations, volunteers (known as citizen scientists) have helped make thousands of important scientific discoveries. Want to work on some real NASA science? Click on this link to check out multiple science projects.

<https://science.nasa.gov/citizenscience>

### **Code a Mars Rover Driving Game**

- Use Python to code a game that simulates how NASA explores Mars using rovers. Your game will challenge players to drive a Mars rover from one location to another while avoiding hazards.

<https://www.jpl.nasa.gov/edu/learn/project/code-a-mars-rover-driving-game/>

### **GLOBE Observer (Citizen Scientists)**

- You don't have to be a professional scientist to conduct valuable research. Contribute meaningful data, learn about our changing world, and join an international network of citizen scientists and researchers working together to solve Earth's biggest natural mysteries. This citizen science app

allowing students to take observations and contribute to the Global Learning and Observations to Benefit the Environment (GLOBE) community around the world.

<https://observer.globe.gov/>

### How do exoplanets get their names?

- Exoplanet names can look long and complicated at first, especially in comparison to names like Venus and Mars. But they have a logic behind them that is important to scientists cataloging thousands of planets.

<https://exoplanets.nasa.gov/faq/20/how-do-exoplanets-get-their-names/>

### How to Do a Science Fair Project

- In this video series, a JPL scientist, engineer, and educator team up to help students learn how to observe the world around them and ask questions about the things they observe. Students will learn how to take those observations and turn them into a successful science fair project.

<https://www.jpl.nasa.gov/edu/teach/activity/how-to-do-a-science-fair-project/>

### Mission: Biomes

- Have you ever wondered what it would be like to live in a different part of the world? What would the weather be like? What kinds of animals would you see? Which plants live there? By investigating these questions, you are learning about biomes. A biome is a community of plants and animals living together in a certain kind of climate. Scientists have classified regions of the world into different biomes. Your mission, should you choose to accept it, is to investigate biomes, then test your knowledge about the biomes by completing each mission.

<https://earthobservatory.nasa.gov/biome>

### Mission to Mars Student Challenge

- Get K-12 students exploring Mars with NASA scientists, engineers, and the Perseverance rover as they learn all about STEM and design their very own mission to the Red Planet! Everything you need is right here – including guided education plans, expert tips, and resources from NASA.

<https://www.jpl.nasa.gov/edu/mission-to-mars-student-challenge/>

### MyNASAData

- NASA offers petabytes of global Earth science data collected from satellites but accessing these data in a traditional (or virtual) science classroom can be tricky. Since 2004, My NASA Data has supported students and teachers of grades 3-12 in analyzing and interpreting NASA mission data. Join My NASA Data as we strive to support your integration of authentic Earth data in your instruction.

<https://mynasadata.larc.nasa.gov/>

### Our Solar System Lithograph Set

- This lithograph set features images of the planets, the sun, asteroids, comets, meteors and meteorites, the Kuiper Belt and Oort Cloud, and moons of the solar system. General information, significant dates, interesting facts, and brief descriptions of the images are included.

[https://www.nasa.gov/stem-ed-resources/Our\\_Solar\\_System\\_Lithograph\\_Set.html](https://www.nasa.gov/stem-ed-resources/Our_Solar_System_Lithograph_Set.html)

### Trace Space Back to You

- Have you ever wondered why space exploration should matter to you? Or how the work of NASA scientists and engineers affects your daily life? “Spinoffs” are commercial products and services derived from NASA technology.  
<https://homeandcity.nasa.gov/>

## SOLVE IT!!

### Earth’s Seasons and the Sun: A Crossword Puzzle

- Each year, Earth makes a complete trip around the Sun! Learn about our planet’s journey and important points along its orbit. Visit the two websites to find clues to solve this crossword puzzle!  
<https://www.nasa.gov/stem-ed-resources/seasons-crossword-puzzle.html>

### Forward to the Moon with Artemis

- Play word and number puzzles, spot the difference, coding, tracing, and other activities as we celebrate the 50th anniversary of Apollo, we look forward to NASA’s new Artemis mission that will land the first woman, the first person of color and the next man on the surface of the moon.  
<https://www.nasa.gov/sites/default/files/atoms/files/forwardmoonexploreractivities-1.pdf>

### International Space Station Puzzles

- Challenge your word and math skills while you learn about the International Space Station. Download and print these crossword and emoji math puzzles. Emoji math uses icons and popular emojis in place of numbers, letters and variables in a math problem. Themed puzzles celebrate Nov. 2, 2000, as the first day of continuous habitation of humans living and working on the station.  
<https://www.nasa.gov/stem-ed-resources/iss-puzzles.html>

### ISS Activity Book

- Learn about the International Space Station through completion of fun activities. We hope to excite your students’ imaginations, and engender in them an interest in math and science, culminating in their pursuit of space-related careers and/or hobbies.  
[https://www.nasa.gov/sites/default/files/atoms/files/iss\\_activity\\_book.pdf](https://www.nasa.gov/sites/default/files/atoms/files/iss_activity_book.pdf)

### Junior Ranger Spaceflight Explorer—Explorer's Activity Guide

- Play word and number puzzles while you learn about the Moon, space vehicles that will take humans to the Moon and to Mars, and national parks across the United States. NASA and the National Park Service made this booklet of fun activities. The free, printable booklet has math puzzles, thought questions, spot the difference pictures, matching puzzles, scrambled words and anagrams. Take the pledge to become a Spaceflight Explorer Junior Ranger, and put your name on the certificate.  
<https://www.nasa.gov/stem-ed-resources/junior-ranger-spaceflight.html>

### SCaN Message Decoder Activities (K-2, 3-4, 6-8)

- The Space Communications and Navigation (SCaN) Program has antennas around the world and satellites in space to help guide and

exchange important information for all NASA spaceflight missions. Astronauts, mission controllers, and scientists rely on SCan to transmit message from Earth to space and back in order to communicate. These activities allow students to decode secret messages!

[https://www.nasa.gov/directorates/heo/scan/communications/outreach/students/scan\\_message\\_decoder](https://www.nasa.gov/directorates/heo/scan/communications/outreach/students/scan_message_decoder)

### **Space Tech Fun Pad**

- Technology Drives Exploration. Play word and number puzzles, spot the difference, coding, tracing, matching and other activities as you learn about NASA Technology, NASA Space craft and NASA Spinoffs.

[https://www.nasa.gov/sites/default/files/atoms/files/space\\_tech\\_funpad\\_tagged.pdf](https://www.nasa.gov/sites/default/files/atoms/files/space_tech_funpad_tagged.pdf)



## NASA STEM for Grades 9-12

<https://www.nasa.gov/stem/forstudents/9-12/index.html>

For students in grades 9-12, a large portion of activities and opportunities include not just interaction and hands-on STEM, but also a look ahead towards the future, careers, and what's next. For high school students, they may be looking for inspiration and for some, preparation for post-secondary opportunities. The categories we've highlighted with some of our high school-level activities include:

- **Get Involved:** "I'm interested in NASA and in STEM, now what?" Resources here show students what they can do to get more involved.
- **Solve It:** NASA focuses on solving problems. This section allows high school students the opportunity to solve problems of their own.
- **Build It:** There are many hands-on activities in this section.
- **Explore It:** Activities and resources to allow high school students to dig deeper into specific topics are the focus of this section.

## GET INVOLVED!!

### Citizen Science Projects

- NASA's citizen science projects are collaborations between scientists and interested members of the public. Through these collaborations, volunteers (known as citizen scientists) have helped make thousands of important scientific discoveries. Want to work on some real NASA science? Click on this link to check out multiple science projects.

<https://science.nasa.gov/citizenscience>

### Lower the Boom Citizen Science Activity

- Acting as citizen scientists, students use a free mobile app to collect and submit levels of ambient noise.

<https://www.nasa.gov/stem-ed-resources/nasas-lower-the-boom-citizen-science-activity.html>

### GLOBE Observer (Citizen Scientists)

- You don't have to be a professional scientist to conduct valuable research. Students can contribute meaningful data, learn about our changing world, and join an international network of citizen scientists and researchers who are working together to help solve some of Earth's biggest natural mysteries. This citizen science app allows students to take observations while also contributing to the Global Learning and Observations to Benefit the Environment (GLOBE) community around the world.

<https://observer.globe.gov/>

### Mission: Biomes

- Have you ever wondered what it would be like to live in a different part of the world? What would the weather be like? What kinds of animals would you see? Which plants live there? By investigating these questions, you are learning about biomes. A biome is a community of plants and animals living together in a certain kind of climate. Scientists have classified regions of the world into different biomes. Your mission, should you choose to accept it, is to investigate biomes, then test your knowledge about the biomes by completing each mission.

<https://earthobservatory.nasa.gov/biome>

### **Mission to Mars Student Challenge**

- Explore Mars with NASA scientists, engineers, and the Perseverance rover as they learn all about STEM and design their very own mission to the Red Planet! Everything you need is right here – including guided education plans, expert tips, and resources from NASA.  
<https://www.jpl.nasa.gov/edu/mission-to-mars-student-challenge/>

### **MyNASAData**

- NASA offers petabytes (1 million gigabytes) of global Earth science data collected from satellites; however, accessing all of these data in a traditional (or virtual) science classroom can be tricky. Since 2004, MyNASAData has supported students and teachers in grades 3-12 with analyzing and interpreting NASA mission data.  
<https://mynasadata.larc.nasa.gov/>

## **SOLVE IT!!**

### **Earth's Seasons and the Sun: A Crossword Puzzle**

- Each year, Earth makes a complete trip around the Sun! Learn about our planet's journey and important points along its orbit. Visit the two websites to find clues to solve this crossword puzzle!  
<https://www.nasa.gov/stem-ed-resources/seasons-crossword-puzzle.html>

### **International Space Station Puzzles**

- Challenge your word and math skills while you learn about the International Space Station. Download and print these crossword and emoji math puzzles. Emoji math uses icons and popular emojis in place of numbers, letters and variables in a math problem. Themed puzzles celebrate Nov. 2, 2000, as the first day of continuous habitation of humans living and working on the station.  
<https://www.nasa.gov/stem-ed-resources/iss-puzzles.html>

### **Space Math @ NASA**

- Visit this NASA resource to download hundreds of math problems featuring a behind the scenes look at NASA press releases and discoveries. The problems range from simple scaling and proportions to algebra and calculus, and cover topics spanning all NASA science and engineering activities. You can search for problems by grade level, topic, space science topic, or NASA mission. There are so many possibilities.  
<https://spacemath.gsfc.nasa.gov/>

## **BUILD IT!!**

### **BEST Activity Guide: An Education Guide to the Engineering Design Process**

- NASA's BEST activities nurture development of 21st. Century Skills including communication, collaboration, and innovation. The activities are flexible in terms of materials, time, and students' abilities. guides couple NASA engineering content to teach students the engineering design process while demonstrating NASA's role as a leader in space, technology, aeronautics, and science. While labeled for middle school, these activities are great for high school students and beyond.  
[https://www.nasa.gov/pdf/630754main\\_NASAsBESTActivityGuide6-8.pdf](https://www.nasa.gov/pdf/630754main_NASAsBESTActivityGuide6-8.pdf)

## **BEST Next Generation Activity Guide: Technology Demonstration Missions**

- An additional round of BEST activities designed to directly related to NASA's Technology Demonstration Missions. The missions provide revolutionary, crosscutting technologies that could advance NASA's mission in space and benefit science and industry here on Earth. Missions include Green Propellant Infusion Mission, Deep Space Atomic Clock, Low Density Super Sonic Decelerator and more. While labeled for middle school, these activities are great for high school students and beyond.  
<https://www.nasa.gov/audience/foreducators/best/activities.html>

### **Build a Tetrahedral Kite**

- Build a kite with levels of pyramid shapes from household items such as straws, glue, yarn and tissue paper.  
<https://www.nasa.gov/stem-ed-resources/build-a-tetrahedral-kite.html>

### **Build-It-Yourself: Satellite!**

- An educational game for high school and college age students, where they get to be the scientist by building their own satellite.  
<https://jwst.nasa.gov/content/features/educational/buildItYourself/index.html>

### **Build Your Own Mars Rover**

- The JPL Open-Source Rover is an open source, build it yourself, scaled down version of the 6 wheel rover design that JPL uses to explore the surface of Mars. The Open-Source Rover is designed almost entirely out of consumer off the shelf (COTS) parts. This project is intended to be a teaching and learning experience for those who want to get involved in mechanical engineering, software, electronics, or robotics.  
<https://opensource.rover.jpl.nasa.gov/#!/signup>  
  
<https://github.com/nasa-jpl/open-source-rover>

## **EXPLORE IT!!**

### **Aeronautics for Introductory Physics (9-college)**

- An inquiry based approach to teaching introductory physics, this guide engaged students in 21st century skills, higher level inquiry, and the context of aeronautical research and flight to teach introductory-level physics.  
[https://www.nasa.gov/sites/default/files/atoms/files/aero-intro-physics\\_0.pdf](https://www.nasa.gov/sites/default/files/atoms/files/aero-intro-physics_0.pdf)

### **The Cosmological Red Shift – Changing the light from a galaxy**

- Students learn about the redshift unit of measurement in astronomy, and solve a simple linear equation to explore how the light from very distant galaxies is reddened compared to nearby galaxies.  
<https://jwst.nasa.gov/education/7Page45.pdf>

### **High School Experiments in Infrared Astronomy**

- This Guide will present a variety of basic information about infrared light, including hands-on experiments and mathematical problems that will quickly make you an 'Expert' in the basic science being carried out by the James Webb Space Telescope (JWST). It will also present information gathered by the predecessors to JWST such as the Spitzer Space

Telescope. Educators will find this guide a helpful adjunct to the concepts being taught at high school-level in the areas of light, space science and applied mathematics.

<https://spacemath.gsfc.nasa.gov/SMBooks/IRGuide.pdf>

### Infographics

- Infographics use striking, engaging visuals to communicate information quickly, clearly, and concisely. They provide a combination of imagery, data visualizations, and minimal text that provide an easy-to-understand overview.

<https://www.jpl.nasa.gov/infographics>

<https://www.nasa.gov/exploration/systems/sls/multimedia/infographics.html>

<https://www.nasa.gov/sites/default/files/atoms/files/armd-18x24-infographics-aero-toolkit-06-2020.pdf>

[https://chandra.si.edu/graphics/resources/illustrations/atoms\\_infograph.pdf](https://chandra.si.edu/graphics/resources/illustrations/atoms_infograph.pdf)

[https://www.nasa.gov/sites/default/files/atoms/files/iss20\\_infographic\\_david\\_20200713\\_compressed.pdf](https://www.nasa.gov/sites/default/files/atoms/files/iss20_infographic_david_20200713_compressed.pdf)

[https://www.nasa.gov/sites/default/files/atoms/files/iss20\\_celebrating\\_20\\_years.pdf](https://www.nasa.gov/sites/default/files/atoms/files/iss20_celebrating_20_years.pdf)

### Leveled Readers and More

- NASA Aeronautics' leveled readers series brings the history of American aviation to life by highlighting the accomplishments of famous and historical aviators and the options for STEM careers as seen through the stories of contemporary NASA aeronautics experts. Stories at a variety of reading levels, along with supplemental videos, sound clips, and support pages help bring these stories to life.

<https://www.nasa.gov/aeroresearch/resources/leveled-readers>

### Living in the Age of Airplanes

- The National Geographic documentary, "Living in the Age of Airplanes" is a story about how the airplane has changed the world. This educator guide provides activities for students to explore the social and scientific advances in the speed and distance of human travel, as well as NASA's contributing role in aviation.

<https://www.nasa.gov/sites/default/files/files/Living-in-the-age-of-airplanes-resource-guide.pdf>

### NASA's Launchpad – a part of NASA eClips

- NASA's Launchpad is a collection of both videos and educator guides. Educator Guides provide examples of ways teachers may effectively use video segments as an instructional tool. All lessons are presented in the 5E delivery model and are aligned to national standards for science, math, and technology.

[https://nasaclips.arc.nasa.gov/resources/guides#Full\\_Guide\\_grades\\_9-12\\_Launchpad](https://nasaclips.arc.nasa.gov/resources/guides#Full_Guide_grades_9-12_Launchpad)

<https://nasaclips.arc.nasa.gov/video/launchpad>

### Scope It Out

- The James Webb Space Telescope may be unusual in its appearance - but it has a lot in common with simple tube-shaped telescopes. Play the "Scope It Out!" game to find out more! Scope It Out! includes an introduction to telescopes and two matching games. Be sure to pay attention as you go - the information contained in each level will help you solve the puzzles in the next round. This game is best suited for teens and adults.

<https://www.jwst.nasa.gov/content/features/educational/scopeltOut/index.html>

### VR 360 Tour

- Grab a set of 360 goggles to explore virtual field trips to take students along on a journey into the heart of NASA's Commercial Crew Program (CCP). From visiting the NASA centers where the program first began, and the Boeing and SpaceX facilities where next-generation human-rated spacecraft and rockets are being developed and tested for flight and so much more.

<https://www.youtube.com/playlist?list=PLStC43yAV6zQvFdRe4ch2l8ihBuqTylJf>

## By Topic



For those of you who are looking for STEM materials by topic, the following section provides materials arranged by some of NASA's primary themes: Aeronautics, Earth Science, Moon/Artemis, Solar System and Beyond, and Space Technologies.



### AERONAUTICS

The materials in this section focus on aeronautics research and the work NASA does to help shape the future of flight.

<https://www.nasa.gov/topics/aeronautics/index.html>

NASA is Reinventing Aviation (2022) Video

<https://www.youtube.com/watch?v=kYIcba7PIIk>

## Explore Flight

### Flight Log Experience

- Create your own virtual flight log and fly your name with us on X-planes and more. Includes associated lessons and activities to aeronautics lessons, opportunities to earn virtual endorsements, access to lessons and activities about mapping, and the chance to build a virtual flight log are part of the program.

<https://www.nasa.gov/flightlog/>

### Aeronautics for Pre-K

- Aeronautics for Pre-K is a collection of six STEM learning modules based upon children's books. These resources are most appropriate for story times at educational/science centers, libraries, and pre-K through early elementary classrooms. Each module focuses on a single children's story book, followed by a STEM thematic lesson, including topics associated with gliders in nature (form and function), balloons (sinking and floating, weight), parachutes (fluid thickness and drag), kites (surface area and lift), helicopters and airplanes (force and thrust), and world flyers (geography and global trade).

<https://www.nasa.gov/aeroresearch/resources/k-12/aero-for-prek>

### Aeronautics for Introductory Physics (9-college)

- An inquiry approach to teaching physics, this guide engaged students in 21st century skills, higher level inquiry, and the context of aeronautical research and flight to teach introductory-level physics.

[https://www.nasa.gov/sites/default/files/atoms/files/aero-intro-physics\\_0.pdf](https://www.nasa.gov/sites/default/files/atoms/files/aero-intro-physics_0.pdf)

### **Aeronautics@Home:**

- Hands-on aeronautics themed activities, videos, puzzles and games that can be completed at home without any formal instruction. Also includes educational activities and lessons in a separate section.  
<https://www.nasa.gov/aero-at-home>

### **Coloring Pages**

- Coloring Pages including the “High Flyers Alphabet Book.” Available in English and Spanish, a variety of coloring pages and an alphabet book provide introductory level aeronautics content along with early literacy skills.  
<https://www.nasa.gov/aero-at-home> (“Color It!” section)

### **Design Challenges**

- Throughout the year, NASA Aeronautics hosts several design challenges. Some challenges are for post-secondary and university students. Others are for a K-12 audience. This link provides one location for all challenges.  
<https://www.nasa.gov/aeroresearch/resources/innovation-challenges>

### **Educator Resources**

- This web page contains a variety of different resources for educators that focus on aeronautics. All grade levels are represented in this section, including pre-K.  
<https://www.nasa.gov/aeroresearch/resources/description/>

### **Leveled Readers and More**

- NASA Aeronautics’ leveled readers series brings the history of American aviation to life by highlighting the accomplishments of famous and historical aviators and the options for STEM careers as seen through the stories of contemporary NASA aeronautics experts. Stories at a variety of reading levels, along with supplemental videos, sound clips, and support pages help bring these stories to life.  
<https://www.nasa.gov/aeroresearch/resources/leveled-readers>

### **Lithographs and Bookmarks**

- Lithographs, or mini-posters, are available for many of NASA Aeronautics’ programs and missions. We also have printable bookmarks. Many are also available in multiple languages.  
<https://www.nasa.gov/aero/nasa-aero-lithographs.html>  
  
<https://www.nasa.gov/aero-at-home> (“Read It!” section)

### **NASA Museum in a Box**

- Hands-on K-12 lessons and activities that focus on physical science and the science of flight. Includes background information for each topic covered, materials lists consisting of everyday materials, step-by-step instructions with pictures, and handouts when appropriate.  
<https://www.nasa.gov/aeroresearch/resources/museum-in-a-box>

### **Smart Skies**

- Using hands-on activities and visualization activities, students learn about distance-rate-time through the lens of air traffic control. The companion

app, Sector 33, allows students to try their hand at increasingly complex air traffic control situations.

<https://smartskies.nasa.gov/>

<https://www.nasa.gov/centers/ames/Sector33/iOS/index.html>

### STEM Learning Modules

- The series of three modules contain activities, videos, and a wide variety of STEM materials that focus on a science concept and tie to a current NASA aeronautics mission or project.

#### Advanced Air Mobility

- Coding and drones in society  
<https://www.nasa.gov/aeroresearch/stem/AAM>

#### Quesst X-59 Module

- The science of sound  
<https://www.nasa.gov/aeroresearch/stem/X59>

#### X-57 Electric Airplane

- Electricity and circuits  
<https://www.nasa.gov/aeroresearch/stem/X57>

### X-59 Maker Bundle

- This series of activities encourages students of all ages and ability levels to “make” with us. Includes coloring sheets, paper airplanes, a 3D paper model, and 3D print files.

*In English and Spanish.*

<https://www.nasa.gov/sites/default/files/atoms/files/x-59-maker-bundle-v8.pdf>



### Next Gen STEM: Aeronaut-X

- Discover how NASA’s technological breakthroughs of today transforms tomorrow’s future with Aeronaut-X. Aeronaut-X STEM activities focus on cutting-edge aeronautics content that will encourage our future aviation explorers to take a deep dive into the world of a new generation of flight. This site includes activity guides for educators and instructional support videos.

*Some materials are available in Spanish as well.*

<https://www.nasa.gov/stem/nextgenstem/aeronaut-x/index.html>

### STEM Toolkits: Sustainable Aviation

- This toolkit contains a compilation of lessons, activities, videos, and resources that help you teach about sustainability in aviation. Includes activities that focus on electricity and circuitry as well.

<https://www.nasa.gov/sustainable-aviation-toolkit>



## EARTH SCIENCE

NASA uses the vantage point of space to increase our understanding of our home planet, improve lives, and safeguard the future. Earth Science STEM lessons and resources include citizen science opportunities as well as activities related to climate and sustainability. <https://science.nasa.gov/>

## Explore Earth

### STEM Earth Toolkit

- This resource is filled with curated Earth Science K-4, 5-8, and 9-12 lesson plans, videos, and educational activities to engage and inspire the next generations  
<https://www.nasa.gov/stem/nextgenstem/earth-toolkit.html>

### Citizen Science Projects

- NASA's citizen science projects are collaborations between scientists and interested members of the public. Through these collaborations, volunteers (known as citizen scientists) have helped make thousands of important scientific discoveries. Want to work on some real NASA science? Click on this link to check out multiple science projects.  
<https://science.nasa.gov/citizenscience>

### Earth Observatory

- Explore your backyard or the other side of the Earth with EO Explorer. For more than 20 years, the Earth Observatory has published stories from all over our planet. Now we encourage you to explore those stories in a different way: by location.  
<https://earthobservatory.nasa.gov/map#2/0.0/-0.2>

### Earth Observatory (EO) KIDS

- EO Kids is written for audiences aged 9 to 14. It is published with support from NASA's Landsat, Terra, and Aqua missions. Read all about a variety of Earth science topics like hurricanes and air pollution and experiment with exciting hands-on activities with EO Kids.  
<https://earthobservatory.nasa.gov/blogs/eokids/>

### GLOBE Observer (Citizen Scientists)

- You don't have to be a professional scientist to conduct valuable research. Contribute meaningful data, learn about our changing world, and join an international network of citizen scientists and researchers working together to solve Earth's biggest natural mysteries. This citizen science app allowing students to take observations and contribute to the Global Learning and Observations to Benefit the Environment (GLOBE) community around the world.  
<https://observer.globe.gov/>

### GLOBE Program

- Since its founding on Earth Day 1994, the Global Learning and Observations to Benefit the Environment (GLOBE) Program has been providing students and the public worldwide with the opportunity to

meaningfully contribute to our understanding of the Earth system and global environment. Through interdisciplinary activities and inquires into the various Earth spheres, GLOBE gives students a hands-on approach to the scientific method, as citizens conduct real-world research. Elementary level activities through adult opportunities are a part of the program. A sample of the many elementary activities are found below.

*Note that each elementary activity also includes a storybook.*

<https://www.globe.gov/web/elementary-globe>

### **GLOBE Air Quality**

- Students will investigate why aerosols and other types of air pollution affect the color of the sky. They'll also learn how to describe the sky color and the underlying conditions in the atmosphere.

<https://www.globe.gov/web/elementary-globe/overview/air-quality>

### **GLOBE Clouds**

- Students will explore how different types of clouds can be described via analogy. As they start understanding how to observe clouds, they'll create models of the different cloud types and contrails.

<https://www.globe.gov/web/elementary-globe/overview/clouds>

### **GLOBE Earth System**

- Students will examine how water, air, soil, and living creatures interact within the Earth system. They'll also learn the importance of each role to the planet's ecology.

<https://www.globe.gov/web/elementary-globe/overview/earth-system>

### **GLOBE Seasons**

- Students will discover how hummingbirds deal with seasonal changes. To broaden their scope, they'll use science journals to describe the changes in their own local environment as it cycles through the different seasons.

<https://www.globe.gov/web/elementary-globe/overview/seasons>

### **GLOBE Water**

- Students will learn how to describe a creek by making observations, taking measurements, and investigating its macroinvertebrates. To accomplish this, they'll be introduced to measurement tools like rulers and magnifying glasses.

<https://www.globe.gov/web/elementary-globe/overview/water>

### **Mission: Biomes**

- Have you ever wondered what it would be like to live in a different part of the world? What would the weather be like? What kinds of animals would you see? Which plants live there? By investigating these questions, you are learning about biomes. A biome is a community of plants and animals living together in a certain kind of climate. Scientists have classified regions of the world into different biomes. Your mission, should you choose to accept it, is to investigate biomes, then test your knowledge about the biomes by completing each mission.

<https://earthobservatory.nasa.gov/biome>

### **MyNASAData**

- NASA offers petabytes of global Earth science data collected from satellites but accessing these data in a traditional (or virtual) science classroom can be tricky. Since 2004, My NASA Data has supported students and teachers in analyzing and interpreting NASA mission data. Join My NASA Data as we strive to support your integration of authentic Earth data in your instruction.

<https://mynasadata.larc.nasa.gov/>



## ARTEMIS

With Artemis missions, NASA will land the first woman and first person of color on the Moon, using innovative technologies to explore more of the lunar surface than ever before. We will collaborate with commercial and international partners and establish the first long-term presence on the Moon. Then, we will use what we learn on and around the Moon to take the next giant leap: sending the first astronauts to Mars.

<https://stem.nasa.gov/artemis/>

## Explore Humans in Space

### Commercial Crew Program STEM Mission Toolkit

- Learn and teach more about NASA's commercial crew program with this toolkit that contains activities, bulletin board ideas, stories, and multimedia.
- [https://www.nasa.gov/stem/nextgenstem/commercial\\_crew/ccpstemtoolkit](https://www.nasa.gov/stem/nextgenstem/commercial_crew/ccpstemtoolkit)

### Host an Artemis Watch Party

- Host a virtual Artemis launch watch party and let us know about it! Then print out a virtual Artemis passport and add a stamp to it when Artemis launches.

<https://www.eventbrite.com/e/artemis-i-registration-144043131885>

(watch party registration)

[https://nasa-external-](https://nasa-external-ocomm.app.box.com/s/kafmie6ynk50h8ewbm3r9w2zz0fub88s)

[ocomm.app.box.com/s/kafmie6ynk50h8ewbm3r9w2zz0fub88s](https://nasa-external-ocomm.app.box.com/s/kafmie6ynk50h8ewbm3r9w2zz0fub88s) (passport)

### Artemis Student Challenges

- Student challenges that range from the "Spacesuit User Interface Technologies for Students" challenge to the "First Nations Launch" to "Micro-g NEXT" ask students to help NASA solve some of the toughest challenges in space exploration.

<https://stem.nasa.gov/artemis/>

### Teach Artemis with the "Artemis STEM Learning Pathway"

- NASA's Artemis I STEM Learning Pathway of STEM resources and ready-to-use content comes in eight weekly themes. Each week's resources can be used individually or in combination to create a lesson plan tied to the learning series' weekly theme. Not only will you build your students' STEM skills; you will join NASA in launching the next era of human exploration.

<https://www.nasa.gov/stem-ed-resources/sign-up-to-receive-stem-resources-for-upcoming-artemis-i-test-launch.html>

### Space Station

- For over twenty years, longer than our K-12 students have been alive, the International Space Station (ISS) has been orbiting Earth. The space station is also a unique science laboratory. Several nations worked together to build and use the space station. NASA is using the space station to learn more about living and working in space. These lessons will make it possible to send humans farther into space than ever before.

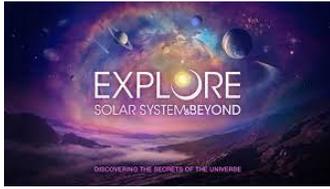
[https://www.nasa.gov/mission\\_pages/station/main/index.html](https://www.nasa.gov/mission_pages/station/main/index.html)

### **Space Station Explorers:**

- The International Space Station labs and experiments are managed by the ISS National Laboratory. Their Space Station Explorers program is made up of educator Space Station Ambassadors, lesson plans and activities, higher education opportunities, STEM guides, and at-home activities.  
<https://www.issnationallab.org/stem/>

### **STEM on Station / STEMonstrations**

- This series of short videos (typically less than five minutes) demonstrate STEM concepts—except they are done on the International Space Station. Topics such as simple machines, the five senses, the moment of inertia, Newton's First Law of Motion and more are demonstrated by NASA astronauts.  
<https://www.nasa.gov/stemonstrations>



## SOLAR SYSTEM and BEYOND

As NASA missions explore our solar system and search for new worlds, they are finding water in surprising places. Water is but one piece of our search for habitable planets and life beyond Earth, yet it links many seemingly unrelated worlds in surprising ways. NASA is looking to answer key questions about our home planet, neighboring planets in our solar system and the universe beyond. Activities in this section help students search for answers about Earth, the Solar System, and beyond.

### Explore Solar System and Beyond

#### HUBBLE

- Even though the Hubble Space Telescope is nearing the end of its lifespan, educational resources from the Hubble team are still valid and can be used to teach more about stars, the electromagnetic spectrum, and how we explore.

<https://www.nasa.gov/audience/foreducators/hubble-resources.html>

#### Mars Exploration Program

- Explore Mars with NASA. Whether its in Mars' atmosphere with the Ingenuity helicopter, or on the Mars 2020 Perseverance Rover, or through the InSight Lander, NASA is constantly exploring more about the Red Planet's mysteries. A variety of resources for K-4, 5-8, and 9-12 are available.

<https://mars.nasa.gov/>

<https://mars.nasa.gov/participate/marsforeducators/> (education resources)

#### James Webb Space Telescope (JWST)

- NASA's James Webb Space Telescope has been deployed and is located past the Moon. Visit the site's education section for lesson ideas differentiated for formal and informal education situations, activities for students, and special features.

<https://www.jwst.nasa.gov/>

#### LUCY

- Launched in October of 2021, Lucy will be the first space mission to explore a population of small bodies known as Trojans. Trojans provide a unique, never-before-explored sample of the remnants of our early Solar System. Share videos, animations, activities, stories, and more.

<http://lucy.swri.edu/> (about Lucy)

<https://solarsystem.nasa.gov/news/1895/lucy-mission-resources/>  
(resources)

#### Heliophysics

- NASA's Heliophysics Science Division conducts research on the Sun, its extended solar-system environment (the heliosphere), and interactions of Earth, other planets, small bodies, and interstellar gas with the heliosphere. Check out this extensive STEM resource archive.

<https://science.gsfc.nasa.gov/heliophysics/eduresources>



## SPACE TECHNOLOGIES

Technology drives exploration to the Moon, Mars and beyond. NASA's Space Technology Mission Directorate (STMD) develops transformative space technologies to enable future missions. STMD engages and inspires thousands of entrepreneurs, researchers, and innovators, creating a community of America's best and brightest working on the nation's toughest challenges.

### Explore Space Tech

#### First Woman

- The first issue of a 3-part series, the graphic novel *First Woman* follows the story of Callie as she sets out to become the first woman on the Moon. Resources include a printable graphic novel, app, audio book, and more. Available in English and Spanish.

<https://www.nasa.gov/specials/calliefirst/>

#### NASA Home and City

- This interactive web page allows users to see what NASA technology can be found in their homes and in the cities and towns where they live.

<https://homeandcity.nasa.gov/>

#### MEDLI2 Student Activity

- In this activity, students design, build, and test a heat shield for your Mars mission using the Engineering Design Process.

[https://www.nasa.gov/directorates/spacetech/Design\\_Test\\_a\\_Heat\\_Shield\\_for\\_Your\\_Mars\\_Mission](https://www.nasa.gov/directorates/spacetech/Design_Test_a_Heat_Shield_for_Your_Mars_Mission)

#### Mission to Mars Student Challenge

- Get K-12 students exploring Mars with NASA scientists, engineers, and the Perseverance rover as they learn all about STEM and design their very own mission to the Red Planet! Everything you need is right here – including guided education plans, expert tips, and resources from NASA.

<https://www.jpl.nasa.gov/edu/mission-to-mars-student-challenge/>

#### Space Tech Activities at Home

- A compilation of activities and resources that can be completed at home.

[https://www.nasa.gov/directorates/spacetech/Space\\_Tech\\_Activities\\_at\\_Home/](https://www.nasa.gov/directorates/spacetech/Space_Tech_Activities_at_Home/)

#### Tech Logic Series

- *You Can't Take It All With You*: In this series of engineering design activities, students compare traveling to Mars to exploring different places on Earth. They then design and test small model shelters using simulated in-situ resources found on Mars.

[https://www.nasa.gov/sites/default/files/atoms/files/you\\_cant\\_take\\_it\\_all\\_with\\_you\\_grades\\_k-5\\_educators\\_tagged.pdf](https://www.nasa.gov/sites/default/files/atoms/files/you_cant_take_it_all_with_you_grades_k-5_educators_tagged.pdf) (K-5)

[https://www.nasa.gov/sites/default/files/atoms/files/you\\_cant\\_take\\_it\\_all\\_with\\_you\\_grades\\_6-12\\_educators\\_tagged.pdf](https://www.nasa.gov/sites/default/files/atoms/files/you_cant_take_it_all_with_you_grades_6-12_educators_tagged.pdf) (6-12)

## SECTION 4: VIDEO RESOURCES



If you've ever used NASA videos, you won't be surprised to learn that NASA earns awards every year for high quality, engaging videos and multimedia resources. You can find videos that help explain complex topics, can be used to inspire and excite students, and even learn how you, as an educator, can conduct lessons and activities.

### **NASA YouTube Channel**

[https://www.youtube.com/channel/UCLA\\_DiR1FfKNvjuUpBHmylQ](https://www.youtube.com/channel/UCLA_DiR1FfKNvjuUpBHmylQ)

### **NASA STEM Stars**

This middle school video series highlighting one of our subject matter experts per episode is broadcast live, then made available on our NASA STEM Stars site.

<https://www.nasa.gov/stem/nextgenstem/nasa-stem-stars/index.html>

### **NASA eClips**

<https://nasaclips.arc.nasa.gov/>

### **Mars in a Minute**

<https://www.youtube.com/playlist?list=PL56421C9A51D1F427>

### **Other inspiring videos**

- 7 Minutes of Terror: The Challenges of Getting to Mars  
[https://www.youtube.com/watch?v=Ki\\_Af\\_o9Q9s](https://www.youtube.com/watch?v=Ki_Af_o9Q9s)
- 29 Days on the Edge  
<https://youtu.be/uUAvXYW5bml>
- Future Frontier  
[http://youtu.be/Uv3K9ij\\_-bl](http://youtu.be/Uv3K9ij_-bl)
- How to use the Bathroom in Space  
<https://youtu.be/3VoeRAR0YgE>
- Karen Nyberg Shows How You Wash Hair in Space  
<https://youtu.be/uljNfZbUYu8>
- NASA Aeronautics' "The Quiet Crew" career video series  
[https://www.youtube.com/playlist?list=PLiuUQ9asub3QzXTLxiWkei0b\\_2FAO6NqM](https://www.youtube.com/playlist?list=PLiuUQ9asub3QzXTLxiWkei0b_2FAO6NqM)
- Spacesuits for the Next Explorers (Full feature)  
<https://youtu.be/vPkamuLqwM8>
- We Are NASA  
<https://youtu.be/WeA7edXsU40>
- We Go as the Artemis Generation

<https://youtu.be/dOKKkV-30dE>

- We Are the Explorers  
<https://youtu.be/e7DEw70LVWs>
- Walking On Air  
[https://youtu.be/hWz5ltE\\_l4c](https://youtu.be/hWz5ltE_l4c)

## SECTION 5: STEM @ HOME



### SpacePlace

NASA's Space Place is a website dedicated to kids in upper elementary school. Games, videos, and activities that can be done at home are a part of the site, and it is available in Spanish as well. A section for parents and educators also provides more resources and links.

<https://spaceplace.nasa.gov/>

### NASA at Home

Explore NASA right at home, no experience necessary! E-books, videos and podcasts, virtual tours and apps, and activities for kids and families can all be found here.

<https://www.nasa.gov/specials/nasaathome/index.html>

### Aero@Home

Started during the height of the COVID pandemic, NASA's Aeronautics@Home page contains links to aeronautics-based hands-on activities, videos, puzzles and games, and even educator guides. The activities can be completed by just about anyone with little guidance and often use everyday materials.

<https://www.nasa.gov/aero-at-home>

## SECTION 6: CAREERS



### Ask SME: Close-up with a NASA Subject Matter Expert

Ask SME videos are professionally developed to capture a glimpse of NASA SME's personal interests and career journeys. Each can be used to spark student interest and broaden their ideas of the STEM workforce.

<https://nasaclips.arc.nasa.gov/careerconnection>

### Careers website

For nine years in a row, NASA has been named the “Best Place to Work in the Federal Government.” Do you want to know why or how people come to NASA? Check out this site to begin your tour.

<https://www.nasa.gov/careers>

### Internships

Internships are not just for students interested in engineering; NASA needs photographers, graphic designers, and all types of jobs in-between. While the internships are quite competitive, they are available in the spring, summer, and fall each year. NASA has a variety of internships that start in high school at age 16 and go through post-graduate studies.

<https://intern.nasa.gov/>

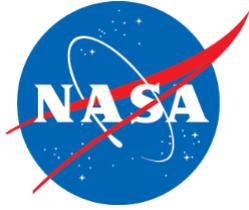
### Women@NASA

NASA is dedicated to supporting a diverse pool of students and those interested in careers at NASA and in STEM. This includes two sites that support women in STEM and at NASA. Inspiring videos and other resources can be found here.

<https://www.nasa.gov/women>

<https://women.nasa.gov/>

## OTHER



### En Español

Many NASA lessons, activities, resources, and videos are also available in Spanish. These can be found within each resource and coming soon, a site devoted solely to resources in Spanish. *(Coming soon)*

### Other Searchable Sites

- JPL Educator
  - <https://www.jpl.nasa.gov/edu/teach/>
- NASA Wavelength
  - <https://science.nasa.gov/learners/wavelength>
- MyNASAData
  - <https://mynasadata.larc.nasa.gov/search?keys=>

*This virtual STEM toolkit was created, in part, to support educational programs within the Choctaw Nation of Oklahoma. For any questions related to the above resources, please contact April Lanotte [april.a.lanotte@nasa.gov](mailto:april.a.lanotte@nasa.gov) or Barbie Buckner [barbie.buckner@nasa.gov](mailto:barbie.buckner@nasa.gov).*

National Aeronautics and Space Administration

**Headquarters**  
300 E. Street, SW  
Washington, DC 20546

**[www.nasa.gov](http://www.nasa.gov)**

EP-2022-06-550-HQ